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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/660,629	09/12/2003	Tsuyoshi Kaneko	116899	6810
25944	7590	07/21/2005	EXAMINER	
OLIFF & BERRIDGE, PLC P.O. BOX 19928 ALEXANDRIA, VA 22320			VAN ROY, TOD THOMAS	
			ART UNIT	PAPER NUMBER
			2828	

DATE MAILED: 07/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No. 10/660,629	Applicant(s) KANEKO ET AL.	
	Examiner <i>[Signature]</i> Tod T. Van Roy	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>9/12/2003, 1/26/2005, 5/20/2005</u> | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 9-10, 15-18, and 22-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Kondo et al. (JPO 2000-067449).

With respect to claim 1, Kondo discloses a surface emitting device, emitting light in a direction perpendicular to a substrate, comprising: an emitting surface that emits light (fig.1 top of #104), a base member that is provided on the emitting surface (fig.1 #102, emitting surface defined as output of upper mirror layers), and an optical member provided on the base member (fig.1 #111).

With respect to claim 2, Kondo discloses the surface emitting device as outlined in the rejection of claim 1, and further discloses the base member to be of a material that transmits light of a predetermined wavelength (GaAs, wavelength transmission based on energy gap).

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With respect to claim 3, Kondo discloses the surface emitting device as outlined in the rejection of claim 1, and further discloses the optical member to function as a lens (fig.1 #111, [0005]).

With respect to claim 9, Kondo discloses the surface emitting device as outlined in the rejection of claim 1, and further discloses the device to be a surface emitting laser (abs.).

With respect to claim 10, Kondo discloses the surface emitting device as outlined in the rejection of claim 9, and further discloses the surface emitting laser to be formed on a substrate (fig.1 #109), including a resonator with a pillar portion (fig.1 #101), wherein the emitting surface is on an upper portion of the pillar (fig.1 top of #103 on upper surface of pillar #101).

With respect to claim 15, Kondo discloses the surface emitting device as outlined in the rejection of claim 10, and further discloses the base member to be formed integrally with the pillar portion (fig.1 #102 formed integrally with pillar #101).

With respect to claim 16, Kondo discloses the surface emitting device as outlined in the rejection of claim 15, and further discloses the base member to consist of a semiconductor layer (GaAs).

With respect to claim 17, Kondo discloses the surface emitting device as outlined in the rejection of claim 1, and further discloses the device to be an electroluminescent device (light emitted in response to electrical pumping).

With respect to claim 18, Kondo discloses the surface emitting device as outlined in the rejection of claim 10, and further discloses the pillar portion to function as the

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base portion (device functions in same manner when the base is considered to consist of the pillar #101).

With respect to claim 22, Kondo discloses a method of manufacturing a surface emitting device comprising: forming a part that has an emitting surface and functions as the light emitting element ([0036]), forming a base member on the substrate ([0036]), discharging a droplet onto an upper surface of the base member to form an optical member precursor ([0054]), and hardening the optical member precursor to form the optical member ([0066]).

With respect to claim 23, Kondo discloses the surface emitting device as outlined in the rejection of claim 22, and further discloses discharging the droplet using an inkjet method ([0069]).

With respect to claim 24, Kondo discloses the surface emitting device as outlined in the rejection of claim 22, and further discloses adjusting the wettability of the upper surface of the base member with respect to the droplet before discharging the droplet ([0044-52], speaking of applying a chemical to assist in the application droplet placement and retention).

Claims 1 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Aoyama et al. (JPO 06-151972).

With respect to claim 1, Aoyama discloses a surface light emitting device capable of emitting light in a direction perpendicular to the substrate comprising: an emitting surface that emits the light (fig.1 #10), a base member that is provided on the emitting

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surface (fig.1 #14), and an optical member that is provided on an upper surface of the base member (fig.1 #13).

With respect to claim 13, Aoyama discloses the surface emitting device as outlined in the rejection of claim 1, and further discloses the device to be a light emitting diode (abs.).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claim 4 rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo in view of Yoshikawa et al. (US 6154479).

With respect to claim 4, Kondo teaches the surface emitting device as outlined in the rejection of claim 1, but does not teach the optical element to be a polarizer.

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Yoshikawa teaches a vertical cavity laser including the importance of controlling the polarization of the output light (col.2 lines 27-31). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting device of Kondo with the polarizing optical element of Yoshikawa in order to avoid instabilities when used in an optical system (Yoshikawa, col.2 lines 31-36).

Claims 5, 7-8, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo in view of Kakimoto (JPO 63-007674).

With respect to claim 5, Kondo teaches the surface emitting device as outlined in the rejection of claim 1, but does not teach the optical member to be in the form of a sphere or an oval sphere. Kakimoto teaches a surface emitting device utilizing an optical member with a spherical shape (fig.1 #9). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting device of Kondo with the spherical lens of Kakimoto since these lens are well known in the art to be used for the focusing of light over short distances, i.e. from device output surface to fiber, and are readily available for purchase and use.

With respect to claims 7 and 8, Kondo teaches the surface emitting device as outlined in the rejection of claim 1, but does not teach the upper surface of the base member to be curved, and that an angle made between the upper surface of the base member and a side surface of the base member to be an acute angle. Kakimoto teaches a surface emitting device utilizing a curved member (fig.1 #10) whose top surface forms an acute angle with the side surface (fig.1 #10, top surface vs. side

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surface angle). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting device of Kondo with the curved surface of Kakimoto in order to provide for a more secure support, which can aid in preventing the lens from being misaligned during usage.

With respect to claim 11, Kondo teaches the surface emitting device as outlined in the rejection of claim 9, and further teaches the substrate to be a semiconductor ([0024], GaAs), and a resonator to be formed on the substrate (formed between mirrors #104 and #103). Kondo does not teach the emitting surface to be on a reverse side of the substrate. Kakimoto teaches a surface emitting device wherein the emitting surface is on the reverse side of the substrate (fig.1). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting device of Kondo with the emission direction of Kakimoto to allow for the common practice of flip-chip bonding, without interfering the optical output.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo in view of Kondo (JPO 2000-076682).

With respect to claim 6, Kondo '449 teaches the surface emitting device as outlined in the rejection of claim 1, but does not teach a sealing member to be formed to cover part of the optical member. Kondo '682 teaches a surface emitting device that uses a sealing member to cover a part of the optical member (fig.1 #106, electrode functioning to seal lower portion of optical member #102). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting

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device of Kondo '449 with the optical sealing portion of Kondo '682 in order to provide for a more secure support which can aid in preventing the lens from being misaligned during usage.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo in view of Kakimoto and further in view of Nakamura et al. (US 4706101).

With respect to claim 12, Kondo '449 teaches the surface emitting device as outlined in the rejection of claim 9, and further teaches the substrate to be a semiconductor substrate (fig.1 #109, GaAs), and a resonator to be formed on the substrate (formed by mirrors #104 and #103). Kondo '449 does not teach the device to include a concave part being formed in the rear surface of the substrate, or a light path adjusting layer to be buried in the concave part having the emitting surface on the upper surface thereof. Nakamura teaches a surface emitting device in which the a concave part is formed on the rear surface of the substrate (fig.1 #21), and Kakimoto teaches a surface emitting device including a cylindrical part is formed on the rear surface of the substrate wherein a light path adjusting layer is buried therein (fig.1 #11). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting device of Kondo '449 with the concave surface of Nakamura, to increase the amount of light striking the surface with an incident angle greater than the critical angle (better out-coupling the light), as well as the buried light path adjusting layer of Kakimoto, to further increase optical light confinement for out-coupling, in order

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to allow for the common practice of flip-chip bonding without interfering with the optical output.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aoyama in view of Sai et al. (US 6775310).

With respect to claim 14, Aoyama teaches the surface emitting device as outlined in the rejection to claim 1, and further teaches the substrate to be a semiconductor substrate (fig.1 #5, GaAs), and a light emitting element that is formed on the substrate (fig.1 #4). Aoyama does not teach the device to include a pillar portion that includes the active layer in which the emitting portion is on a top surface thereof. Sai teaches a surface emitting device including a pillar portion (fig.1a) including an active layer (fig.1 #4), which emits from the top surface. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting device of Aoyama with the pillar of Sai in order to better confine current, allow for increased heat dissipation, and increase overall device efficiency (Sai, col.7-8 lines 52-5).

Claims 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo '449 in view of Aoyama.

With respect to claim 19, Kondo '449 teaches the surface emitting device as outlined in the rejection of claim 1, and further teaches the optical member to function as a lens, and being in the form of a truncated sphere (fig.1 #111). Kondo '449 does not teach the refractive index of the optical member to be approximately equal to the base

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member or the radius of curvature to be less than or equal to .34 times the distance from the emitting surface to the top of the optical member. Aoyama teaches a surface emitting device including the optical member having a refractive index being the same as the base ([0026]), and that the radius of curvature to be less than or equal to .34 times the distance from the emitting surface to the top of the optical member ([0026], fig.3, teaches $d = 2 \times \text{radius of curvature}$, then d from the claim is $d_{\text{claim}} = (w + d/2)$, since the lens in fig.3 is one half sphere (note 90 degree mark), and the claim relationship becomes $.34 \times (w + d/2) \geq d/2$, wherein if $w = 10$ then $d = 10.3$, see fig.4). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting device of Kondo '449 with the index and curvature relationship of Aoyama in order to improve the joint effectiveness ratio of the device relative to other optical components (Aoyama, fig.4).

With respect to claims 20-21, Kondo '449 teaches the surface emitting device as outlined in the rejection of claim 1, but does not teach the inclusion of an optical waveguide, or an optical transmission apparatus. Aoyama teaches a surface emitting device including its use with an optical waveguide (fiber optic cable) and optical transmission apparatus (photoelectrical detection equipment) ([0040]). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the surface emitting device of Kondo '449 with the waveguide and transmission apparatus of Aoyama as it is well known in the art to use optical fiber in transmission systems to transmit communication or other data.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TVR


MINSUN C. HARVEY
PRIMARY EXAMINER